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## (54) Foldable wall system and foldable container

(57) The present invention relates to a foldable wall system (1) comprising at least two, in particular flat, essentially horizontally aligned panels (2,4) which are joined along a flexible folding axis by at least one film hinge, wherein adjacent to the film hinge, in particular between two adjacent film hinges (6,8), at least one elastic stretch band (16) and/or spring is/are located which is joined, in particular in one piece, with the first panel at least on one of its sides and with the second, adjacent panel at least on its opposite side, and which is separated from the film hinge at least partially, in particular in the area of the folding axis of the film hinge, whereby the elastic stretch band or spring is adapted to be unstretched when the adjacent panels are folded, and stretched when said panels are not completely folded or are unfolded. Also, the invention relates to a collapsible container which comprises a base, two pairs of opposite side walls and a circumferential rim on top of said side walls wherein at least one side wall, in particular both side walls of at least one pair of opposite side walls, comprises a foldable wall system of the invention. Furthermore the invention encompasses methods for the preparation of a foldable wall system and of a collapsible container.

Fig. 1b

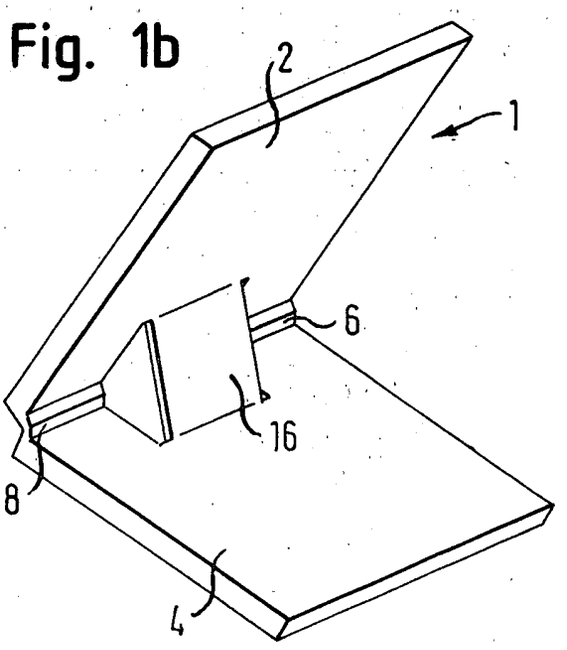


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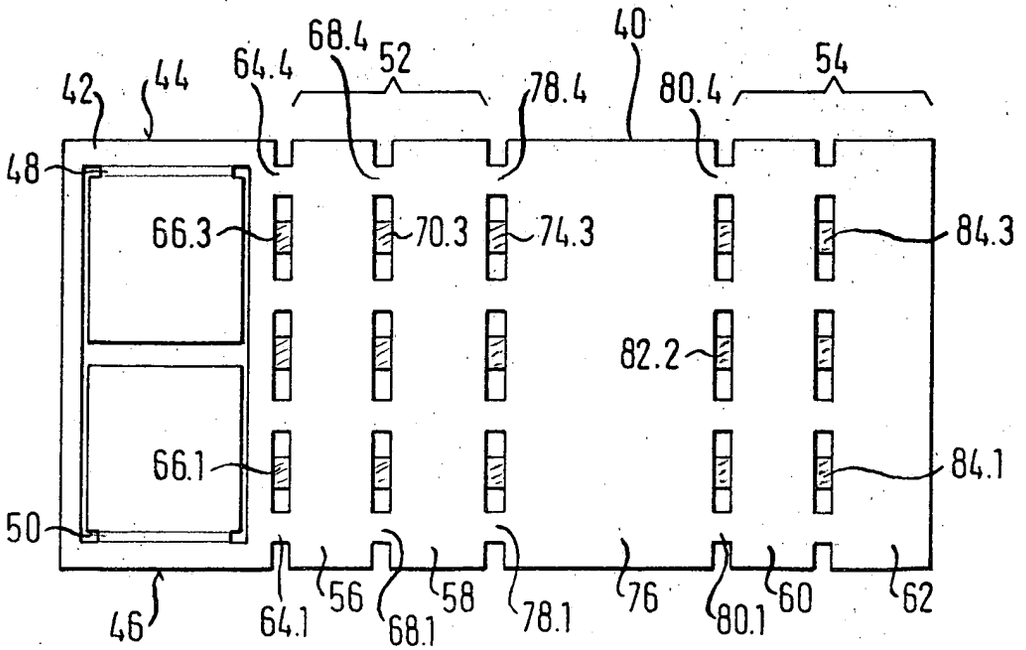
Fig. 4


42
44
64.4
68.4
52
78.4
40
80.4
54
48
66.3
70.3
74.3
84.3
82.2
66.1
84.1
50
46
64.1
56
68.1
58
78.1
76
80.1
60
62

## Description

**[0001]** The present invention relates to a foldable wall system which comprises at least two in particular flat panels which are joined along a flexible folding axis by at least one film hinge. The invention also relates to a collapsible container which comprises a base, two pairs of opposite side walls and a rim. The invention further relates to a method for preparing said foldable wall system as well as to a method for preparing said collapsible container.

**[0002]** Collapsible containers or crates are commonly used to transport and store a variety of items. These containers, especially when used as household articles, are regularly made from injection molded plastic. Most often such collapsible containers are made from a base, a pair of side walls and a pair of end walls which are connected via simple mechanical hinges as for example disclosed in US 6,015,056. For such collapsible containers individual components have to be manufactured in separate steps and finally assembled to furnish a usable crate. The mechanical hinges have to be arranged and designed in such a way that they allow for a reliable and perfect handling of the crate when folded.

**[0003]** Also film hinges have already been used with collapsible crates, as for example described in DE 201 20 563 U1 or in DE 92 18 977 U1. According to DE 201 20 563 U1 the film hinges can be made from plastic providing a container the front and side walls, the base and the hinges of which are made in one piece. A one-piece container is also disclosed in EP 0 575 594 A1 comprising a base and two pairs of opposite side walls, wherein each side wall is connected to the base by means of an intermediate member. With this construction a more stable crate shall be obtained which can be folded and reused several times and which is easy to manufacture.

**[0004]** Film hinges are especially used with caps and closures for bottles or containers, in particular to alleviate the dispensing of fluids or liquids and/or to keep both parts together, so that the cap does not get lost. These film hinges which usually connect the top and bottom part of a cap can be used in combination with a snap element as for example described in CH 683092 A5. Such snap elements are molded to the top and bottom part of a cap and consist of several elastic subsections which may be c-, v- or o-shaped.

**[0005]** Also in US 5,540,343 a locking cap with a snap hinge is disclosed which makes use of a hinge strap that changes into a crosspiece via a thin spot. This construction shall be suited to prevent fractures which result from overstretching of the participating material sections of the snap hinge. However, no specific reference is made to use such snap hinges with systems different from container caps, in particular as the described solution is specifically focussed on problems which occur with circular container caps.

**[0006]** In EP 0 873 944 A1 a closure with a snap hinge cap including a first part adapted to interengage with the open neck of a container and a second part forming a cap is disclosed. A pair of hinge straps is used on opposite sides of an integral hinge. The integral hinge, which can be a film hinge, is bent either in opposite or in identical directions when the first and second parts are in fully open position. Again, as the snap-type hinge of EP 0 873 944 A1 is only concerned with the cap closure of a bottle-like dispenser no reference is made to related or other systems which are with regard to the hinge straps different from caps.

**[0007]** In US 4,403,712 a snap hinge which is integrally made of a plastic material and which can constitute a part of a closure, a deep drawn package or other plastic articles is disclosed. It is essential that the film hinges which link connecting elements to the hinge members are not parallel but diverge so that the connecting elements cover a planar or special triangular surface. The connecting element is preferably joined to the hinge members by oblique film hinges. With the complex geometry of the hinge members and connecting members of US 4,403,712 cut-outs in one or both hinge members should be omitted thereby increasing the latitude of the designer.

**[0008]** The design of film hinges is, thus, mainly adapted to the specific needs of circular-shaped caps and closures, and is not concerned with articles which have to be suited to carry loads.

**[0009]** It is therefore an object of the present invention to provide a collapsible container which can be easily and reliably manufactured, which is based on a very limited number of components only and which can be easily and safely assembled and handled. It is a further object of the present invention to obtain a collapsible container which comprises functional components which support its handling and which stabilize the container when unfolded.

**[0010]** In accordance with the present invention a foldable wall system has been found which comprises at least two, in particular flat, panels which are adapted to be aligned horizontally and which are joined along a flexible folding axis, in particular along their adjacent aligned longitudinal edges, by at least one film hinge, wherein adjacent to the film hinge, in particular between two adjacent film hinges, at least one elastic stretch band and/or spring is/are located which is joined, in particular in one piece, with the first panel at least on one of its sides and, in particular in one piece, with the second, adjacent panel at least on its opposite side, and which is separated from the film hinge at least partially, in particular in the area of the folding axis of the film hinge, whereby the elastic stretch band or spring is adapted to be unstretched or less stretched when the adjacent panels are folded, and stretched or more heavily stretched when said panels are not completely folded or are unfolded. Whereas the dimension of a film hinge is usually confined by the distance of two opposite edges of adjacent panels, the opposite edges of a stretch band, which are usually essentially parallel to the folding

axis, are located spaced apart from the folding axis and the two opposite edges of the adjacent panels. Thus, in a preferred embodiment the edge or edge portion of a stretch band is joined to a panel at some distance from the folding axis and the film hinge in the direction perpendicular to said folding axis. The same usually applies to the opposite edge or edge portion which is joined to the adjacent panel in a similar or identical distance from the folding axis.

**[0011]** In one preferred embodiment the elastic stretch band or spring is separated from the film hinge by a slit, a cut or a gap which is located within the folding axis and/or extends into both adjacent panels, in particular having essentially identical dimensions in both directions, thereby separating an edge of the stretch band from the film hinge and both panels. A slit and also a gap according to the invention have a longitudinal and a lateral dimension, the gap usually having a greater lateral dimension than the slit. A cut according to the invention separates a film hinge and opposite parts of adjacent panels from an adjacent stretch band leaving both in essentially close contact. Usually, the length of a slit which corresponds to the distance of opposite edges of a stretch band which are essentially in parallel to the folding axis and with which the stretch band is usually joined to said adjacent panels can vary to a great extent depending, for example, on the size and weight of the panels and on the size of the film hinges. Preferably, a stretch band has at least three times the length of a film hinge of a foldable wall system of the invention.

**[0012]** Provisions are being made that at least one edge of the slit, cut or gap, in particular the edge adjacent to a film hinge, is arranged essentially perpendicular to the folding axis.

**[0013]** Further provisions may be made that the slit or gap is rectangular in shape and/or exhibits, in particular adjacent to the film hinge, a linear edge and/or, in particular adjacent to the stretch band, an edge having the shape of an arc of a circle.

**[0014]** Further, it is preferred that two or more slits, cuts or gaps are aligned essentially in parallel to each other and in particular essentially perpendicular to the folding axis, thereby confining the width of the stretch band displaced between two adjacent slits, cuts and/or gaps. It has been found to be of particular advantage to make use of two or more stretch bands along a folding axis adjacent to each other and/or in consecutive order or sequence with film hinges. Although, each stretch band can be individually shaped, at least the stretch bands along one folding line have a more or less identical or similar design and size.

**[0015]** According to one aspect of the invention the folding edge of the film hinge and/or the stretch band is/are displaced into the same or in particular opposite plains of adjacent panels when completely unfolded. Film hinges usually comprise wall elements which are each joined to opposite walls and panels and also a folding area or folding edge between these wall elements which regularly projects from the plain of the opposite wall elements of the film hinge when completely unfolded. The folding edge can be brought in plain with the surface of adjacent panels when completely unfolded by extending the width of the panel and/or shifting said wall elements of the film hinge away from said surface towards the opposite surface of the panels. Preferably, the folding edge of a film hinge and the stretch band are not arranged in the same plain when the wall system of the invention is completely unfolded.

**[0016]** In another embodiment of the invention the elastic stretch band is displaced out of the plain of adjacent panels when completely unfolded. In this embodiment opposite edges of a stretch band can be placed or joined to the surface of adjacent panels thereby not or only partially being in plain with these surfaces when unfolded.

**[0017]** It has been found to be preferable that the wall system is made from plastic, in particular from polypropylene. Suitable plastic materials also comprise other polyolefins such as polyethylene, polyamides, aliphatic polyketones, polyesters such as PBT and PET, polyphenylene ether, PVC, styrene(co)polymers such as ASA, ABS or SAN, or mixtures thereof. Suitable polyketones and their manufacture are for example disclosed in EP 0 322 018 A2.

**[0018]** Provisions may be made that the wall system is made by injection molding, extrusion, coextrusion, compression molding, transfer molding, reaction injection molding or reinforced reaction injection molding, in particular in one piece. Preferably, the wall system is made from polypropylene, in particular by injection molding.

**[0019]** According to another embodiment at least one panel comprises at least one hole and/or cut-out, in particular a pattern of holes and/or cut-outs.

**[0020]** Further objects of the invention have been solved by a collapsible container which comprises a base, two pairs of opposite side walls and a, in particular circumferential, rim or at least one rim section on top of said side walls, wherein at least one side wall, in particular both side walls of at least one pair of opposite side walls, comprises a foldable wall system which comprises at least two, in particular flat, panels which are adapted to be aligned horizontally and which are joined along a flexible folding axis, in particular along their adjacent aligned longitudinal edges, by at least one film hinge, wherein adjacent to the film hinge, in particular between two adjacent film hinges, at least one elastic stretch band and/or spring is/are located which is joined, in particular in one piece, with the first panel at least on one of its sides and, in particular in one piece, with the second, adjacent panel at least on its opposite side, and which is separated from the film hinge at least partially, in particular in the area of the folding axis of the film hinge, whereby the elastic stretch band or spring is adapted to be unstretched or less stretched when the adjacent panels are folded, and stretched or more heav-

ily stretched when said panels are not completely folded or are unfolded, i.e. a wall system according to the invention.

**[0021]** According to one embodiment of the invention at least one side wall, in particular both side walls of at least one pair of opposite side walls, is/are joined to the base via at least one film hinge.

**[0022]** According to another embodiment of the invention at least one first side wall, in particular both side walls of a pair of opposite side walls, and/or one, in particular longitudinal, second, in particular adjacent, side wall is/are attached to the circumferential rim via at least one film hinge.

**[0023]** Furthermore, provisions can be made that at least one edge of the rim and a side wall being joined to said edge via at least one film hinge form a foldable wall system according to the present invention, the edge of the rim representing a first panel and the side wall representing a second panel. Thus, in one embodiment of the invention also at least one edge of the rim is joined to a side wall or the upper panel of a side wall by at least one, in particular at least two film hinges and at least one stretch band and/or spring thereby stabilizing the container when unfolded and also alleviating the unfolding process.

**[0024]** It has been found to be also preferable when one pair of opposite side walls is attached to the base each via at least one film hinge. Also, similar to the connection between the rim and a side wall, the base can be joined to at least one side wall by use of at least one, in particular at least two, film hinges and at least one stretch band.

**[0025]** It is particularly preferred that the base, at least one pair of opposite side walls, in particular both pairs of opposite side walls, at least one film hinge, in particular all film hinges, at least one stretch band, in particular all stretch bands, and/or the rim or at least one rim section are made from plastic, in particular in one piece.

**[0026]** A collapsible container according to the invention is well suited when polyesters such as PET or PBT, polyolefins such as polyethylene or polypropylene, polyamides, polyketones, polyphenylene ether or styrene(co)polymers such as SAN, ASA or ABS, PVC or mixtures thereof, in particular injection molded polypropylene, is/are used as plastic material.

**[0027]** In one aspect of the invention the film hinges and/or the stretch band are joined to adjacent panels essentially along the center lines of opposite side edges of said panels. A side edge of a panel or side wall connects opposite surfaces of one panel or one side wall. As the stretch band is usually bigger in size than a film hinge, the side edges of opposite panels the film hinge is joined to are regularly much closer towards each other than those edges of said opposite panels the stretch band is joined to at opposite sides.

**[0028]** In addition, the invention provides for that at least one film hinge and/or at least one stretch band is/are arranged asymmetrically with regard to the center lines of the side edges of joined adjacent panels or walls and/or of the rim and a joined adjacent side wall. In one embodiment a film hinge can be joined essentially along the center line of one side edge of a panel, rim or side wall, and can be joined to the adjacent panel, side wall or rim away from the center line of said joined panel, rim or side wall.

**[0029]** The invention also encompasses collapsible container wherein the film hinge(s), in particular those film hinge components, and/or stretch band(s), in particular those stretch band components, which join adjacent panels or side walls or which join a rim and a side wall or a panel essentially is/are aligned in plain with the surface spread out by both adjacent panels and/or the rim and an adjacent panel or side wall when completely unfolded, and/or are placed on top or at least partially on top of said panel, rim or side wall surfaces.

**[0030]** Preferably, at least the folding edge of one film hinge is displaced essentially in plain with said two adjacent panels or side walls, or with the rim and an adjacent panel or side wall when completely unfolded. It is most preferred when the folding edge of a film hinge and, in particular an adjacent, stretch band are not aligned in a plain. Preferably, the folding edge and the stretch band are arranged, in particular as far as possible, spaced apart from each other. If for example the folding edge is in plain with the surfaces of joined panels when unfolded the stretch band is arranged at or on top of the opposite surfaces of the adjacent panels.

**[0031]** Furthermore, collapsible container according to the invention can comprise a lid which in particular is joined to the rim via at least one film hinge.

**[0032]** Furthermore, the objects of the present invention are solved by a method for the preparation of a foldable wall system according to the invention and a method for the preparation of collapsible container wherein the wall and the container, respectively, are made by injection molding, extrusion, coextrusion, compression molding, transfer molding, reaction injection molding or reinforced reaction injection molding, in particular in one piece.

**[0033]** It has been a surprising perception of the present invention that a collapsible container can be obtained that is void of any mechanical hinges, but nevertheless has safe and easy handling characteristics. Furthermore, the collapsible container according to the invention which is mainly based on a foldable wall system which comprises film hinges and elastic stretch bands and/or springs can be easily and reliably produced. In addition, especially as no or essentially no mechanical hinges are necessary less material and less components are required thereby furnishing a cost-optimized collapsible container having a reduced weight. It is thus of great advantage that the collapsible container can be manufactured in one piece, especially via injection molding, which allows for an economic mass production on a very large scale. In general, only one edge of a panel has to be reversibly of irreversibly fastened to the

rim or to the base to furnish a collapsible container which is ready for use. This fastening can for example be achieved by snap-fit interaction or via a mechanical hinge. Also, these components can be joined by, for example, gluing or welding to yield a foldable or flexible hinge section. It has been found to be particularly advantageous that the foldable wall system according to the invention supports the unfolding of the collapsible container of the present invention. By just lifting the rim of the container the weight of the attached side walls and of the base suffices to trigger the complete unfolding of its side walls. In addition, the foldable wall system is stabilized in the unfolded state by use of a combination of stretch bands and film hinges. When these wall systems of the invention are used with the collapsible container of the invention a stabilized uncollapsed container is obtained. Thus, different from wall systems which are connected via mechanical or pure film hinges no special engagement means have to be provided to stabilize a wall system or container of the invention when unfolded.

**[0034]** In the following the characteristic features of the embodiments of the present invention will be described in more detail by use of several drawings in which

- Fig. 1a) shows an embodiment of a foldable wall system according to the invention;
- Fig. 1b) shows the wall system of Fig. 1a) when partially folded;
- Fig. 1c) shows the wall system of Fig. 1a) when completely folded;
- Fig. 2 depicts an alternative embodiment of a foldable wall system according to the invention;
- Fig. 3 depicts a third embodiment of a foldable wall system according to the present invention;
- Fig. 4 depicts a foldable container according to the invention when disassembled; and
- Fig. 5 depicts an exploded view of a section of a container according to the invention.

**[0035]** In Fig. 1a) a foldable wall system 1 according to the invention is shown which comprises two panels 2 and 4 which are connected via two adjacent film hinges 6 and 8. The film hinges 6 and 8 are located on the back surface 10 of the wall panels 2 and 4 thereby leaving a notch 100 having a wedge-like shape between said two adjacent panels 2 and 4. Directly adjacent to each film hinge 6 and 8 a slit 12 and 14, respectively, is located which in each case has a perpendicular orientation with regard to the film hinge. The slits 12 and 14 are oriented in parallel and have essentially the same length. The space between both slits 12 and 14 comprises an elastic stretch band 16 made from HD-polypropylene. The stretch band 16 is smaller in depth than both panels 2 and 4 and is, as are the film hinges 6 and 8, located at the back surface 10 of the wall system 1. Fig. 1a) shows the wall system 1 according to the invention when completely unfolded, i.e. both panels 2 and 4 or the surfaces of both panels describe an angle of around 180°. Panels 2 and/or 4 can also comprise holes (not shown) to save material and to furnish a light-weight article.

**[0036]** In Fig. 1b) both panels 2 and 4 have been moved towards each other. As soon as the panels 2 and 4 of the foldable wall system 1 do not any longer form a plain as depicted in Fig. 1a) but are moved only slightly towards each other along film hinges 6 and 8 the stretch band 16 exerts a force on both panels 2 and 4 so that their relative movement towards each other is automatically accelerated. When the panels 2 and 4 of the wall system 1 are completely folded as depicted in Fig. 1c) the elastic stretch band 16 is unstretched. When the panels 2 and 4 are aligned in a plain as shown in Fig. 1a) the elastic stretch band 16 also serves to stabilize this planar orientation as it pulls the panels 2 and 4 together. However, as soon as the planar orientation of the wall system 1 is no longer maintained it tends to automatically fold as shown in Figs. 1b) and 1c).

**[0037]** In Fig. 2 an alternative embodiment of a foldable wall system 1' according to the invention is shown. Different from the wall system 1 of Fig. 1 the slits 18 and 20 no longer have a rectangular shape, but have a curved shape yielding a convex stretch band 22. Similar to Fig. 1 the slits or cut-outs 18 and 20 have a linear edge 24 and 26 towards the living hinges 6' and 8'.

**[0038]** In Fig. 3 an alternative foldable wall system 1" is shown comprising only one film hinge 28 the folding edge of which is displaced into the plain of both side panels 30 and 32. This insures that different from the wall system 1 as in Fig. 1c) the wall system 1" folds completely so that the panels 30 and 32 are in close proximity when folded. The stretch band 34 is attached to the front surface of panels 30 and 32. With this arrangement in which the stretch band is located towards or at the front surface of the foldable wall system while the film hinge remains at or towards its back surface, said wall system 1" is particularly stabilized when completely unfolded. Thus, the planar orientation of the wall system 1" according to the invention is subjected to an additional stabilization in said orientation. In addition, as soon as this planar orientation is no longer maintained the folding of the panels 30 and 32 is supported by the stretch band 34 to a very great extent furnishing a folded system wherein panels 30 and 32 are essentially aligned in parallel.

**[0039]** In Fig. 4 an embodiment of an unfolded collapsible container 40 is shown which comprises a rim 42, two opposite side panels 44 and 46 which are both affixed to the rim via film hinges 48 and 50, two longitudinal side walls 52 and 54 which each contain two parallel wall panels 56, 58 and 60, 62, respectively. The upper panel 56 is affixed to the rim 42 via four separate living hinges 64.1 to 64.4. Between adjacent film hinges, e.g. 64.1 and 64.2, a stretch band, 66.1 to 66.3, is located. Similarly, adjacent panels 56 and 58 as well as 60 and 62 are joined by respective film hinges and stretch bands 68.1 to 68.4; 70.1 to 70.3. Furthermore,

the base 76 is joined to the lower panels 58 and 60 via a set of consecutive film hinges 78.1 to 78.4 and 80.1 to 80.4 as well as via stretch bands 82.1 to 82.3 and 84.1 to 84.3. The collapsible container 40 is made in one piece and can be easily assembled. The panel 62 can be affixed to the rim 42 use of snap fits and holes or by a mechanical hinge. Also, panel 62 can be joined to rim 42 by, for example, gluing or welding (not shown).

**[0040]** According to Fig. 5 a collapsible container 40' (only partially shown) being made in one piece, as for example container 40, can also be mechanically joined at the base 86 via the lowest panel 90 of a side wall 88. The lowest panel 90 is joined to the adjacent panel via a film hinge 96 and also via stretch bands (not shown). Snap-fits 92 at the bottom edge of the lowest panel 90 are adapted to fit into holes 94 in the top surface of the base thereby ensuring a safe and reliable connection between the base 86 and the longitudinal side wall 88. It can be as well derived from Fig. 5 that the lower panel 90 can be stabilized by lateral guiding means 98 which can have a tongue-like shape. These guiding means 98 are adapted to fit into respective notches 100 in a rim element 102 of the base 86. As can be derived from Fig. 5 the height of the lowest panel 90 of the longitudinal side wall is essentially identical to the height of the rim element 102 of base 86. The rim element 102 is fixedly connected to the lateral edge of base 86. In one embodiment these guiding means once assembled can be fixed, for example, by glueing, ultrasonic or vibrational welding.

**[0041]** As soon as the collapsible container of the invention is lifted at its rim, the longitudinal side walls start to unfold by the weight of the container. This unfolding is supported by the stretch bands between the longitudinal side panels so that as soon as the container is lifted both initially folded side walls strive to automatically attain the unfolded position.

**[0042]** While the invention has been illustrated and described in detail in the drawings and the above description, the same is to be considered as illustrative and not restrictive in character, it being understood that only the preferred embodiment has been shown and described and that all changes and modifications that come within the scope of the invention are desired to be protected.

Reference list

**[0043]**

| | |
|---|---|
| 1, 1', 1" | foldable wall system |
| 2 | panel |
| 4 | panel |
| 6, 6' | film hinge |
| 8, 8' | film hinge |
| 10 | back surface |
| 12 | slit, gap |
| 14 | slit, gap |
| 16 | stretch band |
| 18 | slit, gap |
| 20 | slit, gap |
| 22 | stretch band |
| 24 | edge of gap 18 |
| 26 | edge of gap 20 |
| 28 | film hinge |
| 30 | panel |
| 32 | panel |
| 34 | stretch band |
| 36 | cut |
| 38 | folding edge of film hinge 28 |
| 40 | collapsible container |
| 42 | rim |
| 44 | lateral side wall |
| 46 | lateral side wall |
| 48 | film hinge |
| 50 | film hinge |
| 52 | longitudinal side wall |
| 54 | longitudinal side wall |
| 56 | panel |
| 58 | panel |
| 60 | panel |
| 62 | panel |
| 64.1 - 64.4 | film hinges |
| 66.1 - 66.3 | stretch bands |
| 68.1 - 68.4 | film hinges |
| 70.1 - 70.3 | stretch bands |
| 72.1 - 72.4 | film hinges |
| 74.1 - 74.3 | stretch bands |
| 76 | base |
| 78.1 - 78.4 | film hinges |
| 80.1 - 80.4 | film hinges |
| 82.1 - 82.3 | stretch bands |
| 84.1 - 84.3 | stretch bands |
| 86 | base |
| 88 | side wall |
| 90 | lowest panel of side wall 88 |
| 92 | snap-fits |
| 94 | holes |
| 96 | film hinge |
| 98 | lateral guiding means |
| 100 | notch |
| 102 | rim element |

**Claims**

1. A foldable wall system (1, 1', 1") comprising at least two, in particular flat, panels (2, 4, 30, 32) which are adapted to be aligned horizontally and which are joined along a flexible folding axis, in particular along their adjacently aligned longitudinal edges, by at least one film hinge (6, 6', 8, 8', 28), wherein adjacent to the film hinge (6, 6', 8, 8', 28), in particular between two adjacent film hinges, at least one elastic stretch band (16, 22, 34) and/or spring is/are located which is joined, in particular in one piece,

with the first panel (2, 30) at least on one of its sides and, in particular in one piece, with the second, adjacent panel (4, 32) at least on its opposite side, and which is separated from the film hinge (6, 6', 8, 8', 28) at least partially, in particular in the area of the folding axis of the film hinge, whereby the elastic stretch band (16, 22, 34) or spring is adapted to be unstretched or less stretched when the adjacent panels (2, 4, 30, 32) are folded, and stretched or more heavily stretched when said panels are not completely folded or are unfolded.

**2.** The foldable wall system (1, 1', 1") according to claim 1, wherein
the elastic stretch band (16, 22, 34) or the spring is separated from the film hinge (6, 6', 8, 8', 28) by a slit, a cut or a gap (12, 14, 18, 20, 36) which is located within folding axis and/or extends into both adjacent panels (2, 4, 30, 32), in particular having essentially identical dimensions in both directions, thereby separating an edge of the stretch band from the film hinge and both panels.

**3.** The foldable wall system (1, 1', 1") according to claim 1 or 2, wherein
at least one edge of the slit, cut or gap, in particular the edge adjacent to a film hinge, is arranged essentially perpendicular to the folding axis.

**4.** The foldable wall system (1, 1', 1") according to claim 3, wherein
the slit or gap (12, 14, 18, 20) is rectangular in shape and/or exhibits, in particular adjacent to the film hinge, a linear edge and/or, in particular adjacent to the stretch band, a non-linear edge, in particular an edge having the shape of an arc of a circle.

**5.** The foldable wall system (1, 1', 1") according to one of the preceding claims, wherein
two or more slits, cuts or gaps (12, 14, 18, 20) are aligned essentially in parallel to each other and in particular essentially perpendicular to the folding axis, thereby confining the width of the stretch band (16, 22, 34) displaced between two adjacent slits, cuts and/or gaps.

**6.** The foldable wall system (1") according to one of the preceding claims, wherein
a folding edge (38) of the film hinge (28) and/or the stretch band (34) is/are displaced into the same or in particular opposite plains of adjacent panels (30, 32) when completely unfolded.

**7.** The foldable wall system (1") according to one of the preceding claims, wherein
the elastic stretch band (34) is displaced out of the plain of adjacent panels (30, 32) when completely unfolded.

**8.** The foldable wall system (1, 1', 1") according to one of the preceding claims, wherein said wall system is, in particular completely, made from plastic, in particular from polypropylene.

**9.** The foldable wall system (1, 1', 1") according to claim 8, wherein
said wall system is made by injection molding, extrusion, coextrusion, compression molding, transfer molding, reaction injection molding or reinforced reaction injection molding, in particular in one piece.

**10.** The foldable wall system according to one of the preceding claims, wherein
at least one panel comprises at least one hole and/or cut-out, in particular a pattern of holes and/or cut-outs.

**11.** A collapsible container (40) comprising
a base (76), two pairs of opposite side walls (44, 46, 52, 54) and a, in particular circumferential, rim (42) or at least one rim section on top of said side walls, wherein at least one side wall, in particular both side walls of at least one pair of opposite side walls, comprises a foldable wall system according to one of claims 1 to 10.

**12.** The collapsible container (40) according to claim 11, wherein
at least one side wall, in particular both side walls (52, 54), of at least one pair of opposite side walls, is/are joined to the base (76) via at least one film hinge (78.1 - 78.4, 80.1 - 80.4).

**13.** The collapsible container (40) according to claims 11 or 12, wherein
at least one first side wall, in particular both side walls (44, 46) of a pair of opposite side walls, and/or one, in particular longitudinal, second, in particular adjacent, side wall (52) is/are attached to the circumferential rim (42) via at least one film hinge (48, 50, 64.1 - 64.4).

**14.** The collapsible container (40) according to one of claims 11 to 13, wherein
at least one edge of the rim (42) and a side wall (52) being joined to said edge via at least one film hinge (64.1 - 64.4) form a foldable wall system according one of claims 1 to 10, the edge of the rim (42) thereby representing a first panel and said side wall representing a second panel.

**15.** The collapsible container (40) according to one of claims 11 to 14, wherein
one pair of opposite side walls (52, 54) is attached to the base (76), each via at least one film hinge (78.1 - 78.4, 80.1 - 80.4).

**16.** The collapsible container (40) according to one of claims 11 to 15, wherein
the base (76), at least one pair of opposite side walls (44, 46, 52, 54), in particular both pairs of opposite side walls, at least one film hinge, in particular all film hinges (48, 50, 64, 78, 80), at least one stretch band, in particular all stretch bands (16, 22, 34), and/or the rim (42) or at least one rim section are made from plastic, in particular in one piece.

**17.** The collapsible container (40) according to claim 16, wherein
polyesters such as PET or PBT, polyolefins such as polyethylene or polypropylene, polyamides, polyketones, polyphenylene ether or styrene(co)polymers such as SAN, ASA or ABS, PVC or mixtures thereof, in particular injection molded polypropylene, is/are used as plastic material.

**18.** The collapsible container (40) according to one of claims 11 to 17, wherein
the film hinges and/or the stretch band are joined to adjacent panels essentially along the center lines of opposite side edges of said panels.

**19.** The collapsible container (40) according to one of claims 11 to 17, wherein
at least one film hinge and/or at least one stretch band is/are arranged asymmetrically with regard to the center lines of the side edges of joined adjacent panels or walls and/or of the rim and a joined adjacent side wall.

**20.** The collapsible container (40) according to claim 19, wherein
the film hinge(s), in particular those film hinge components, and/or stretch band(s), in particular those stretch band components, which join adjacent panels or side walls or which join a rim and a side wall or a panel essentially is/are aligned in plain with the surface spread out by both adjacent panels and/or the rim and an adjacent panel or side wall when completely unfolded, and/or are placed on top or at least partially on top of said panel, rim or side wall surfaces.

**21.** The collapsible container (40) according to one of claims 11 to 20, wherein
at least the folding edge of one film hinge is displaced essentially in plain with two adjacent panels or with the rim and an adjacent panel or side wall when completely unfolded.

**22.** The collapsible container (40) according to one of claims 11 to 21, further comprising a lid which in particular is joined to the rim via at least one film hinge and/or at least one stretch band.

**23.** A method for the preparation of a foldable wall system according to one of claims 1 to 10, wherein
the foldable wall is made from plastic, in particular from polypropylene.

**24.** The method according to claim 23, wherein
the foldable wall system is made by injection molding, extrusion, coextrusion, compression molding, transfer molding, reaction injection molding or reinforced reaction injection molding, in particular in one piece.

**25.** A method for the preparation of a collapsible container according to one of claims 11 to 22, wherein
the collapsible container is made from plastic, in particular from polypropylene.

**26.** The method according to claim 25, wherein
the collapsible container is made by injection molding, extrusion, coextrusion, compression molding, transfer molding, reaction injection molding or reinforced reaction injection molding, in particular in one piece.

Fig. 1a

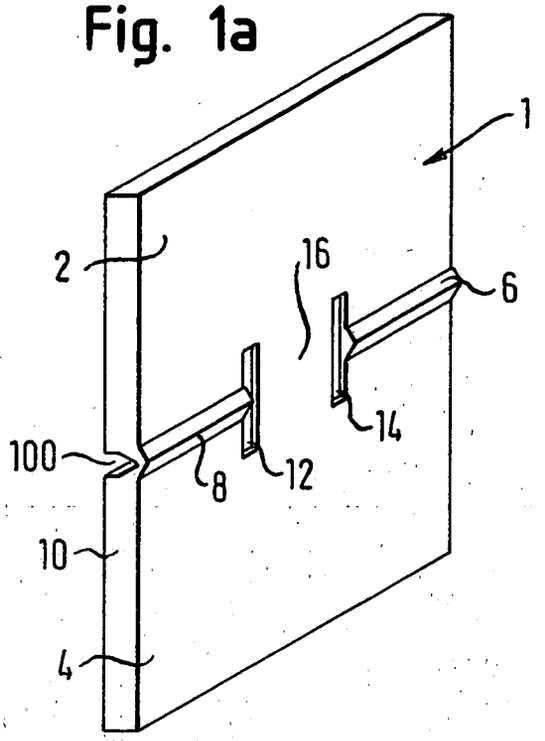



Fig. 1b

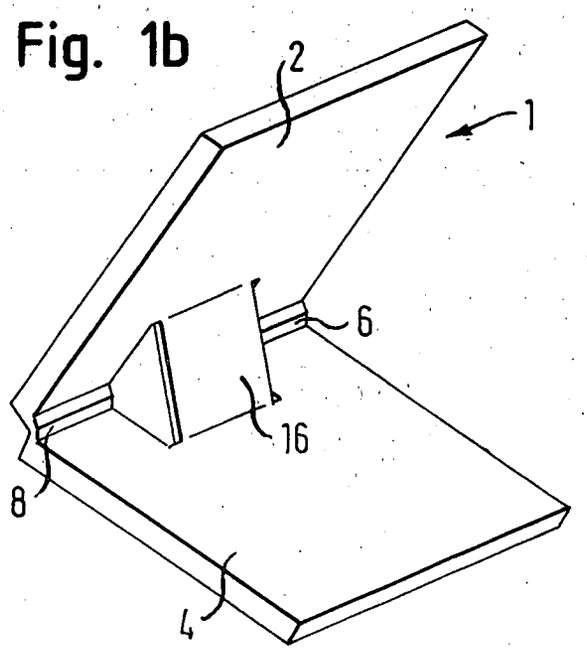


Fig. 1c

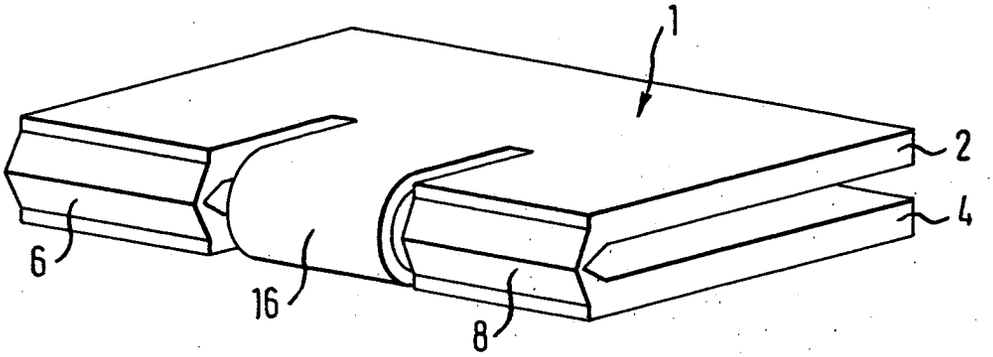



Fig. 2

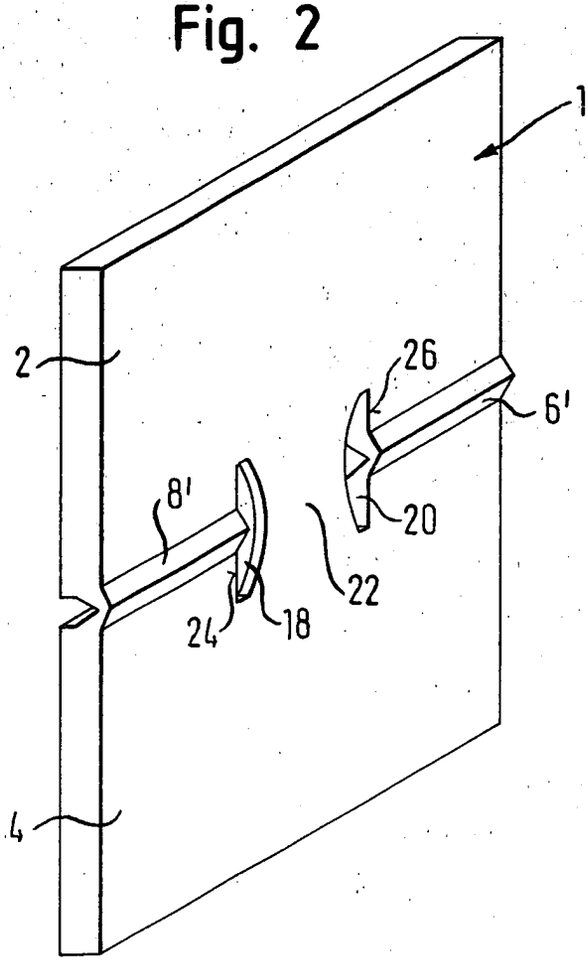
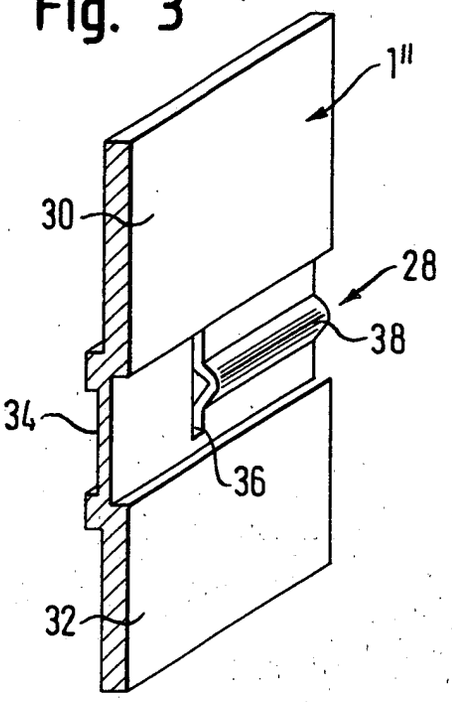


Fig. 3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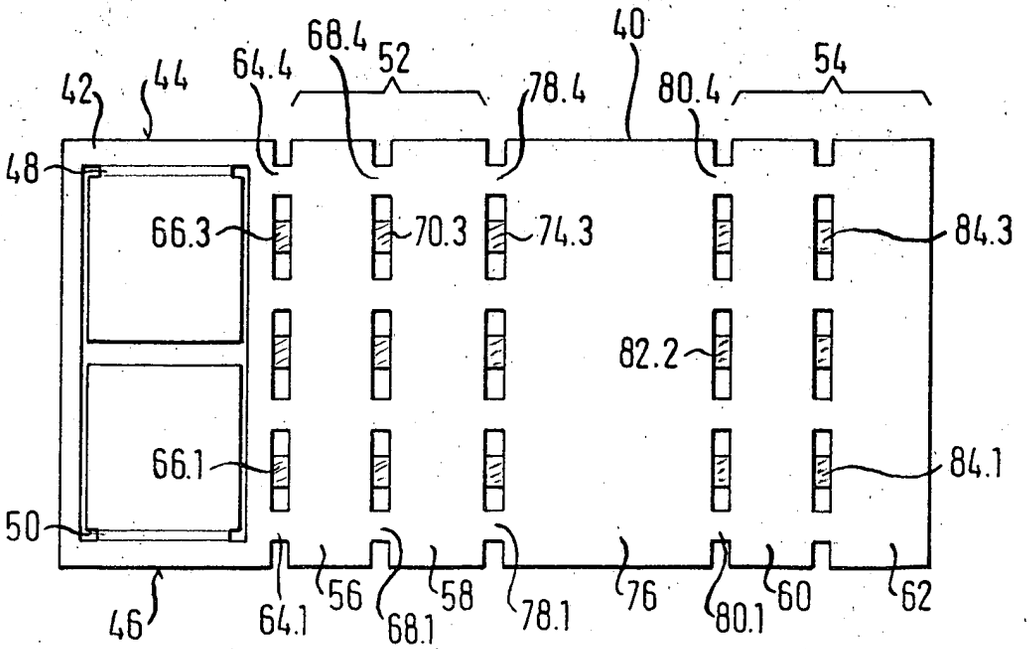
28
38
34
36
32

Fig. 4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44
64.4
68.4
52
78.4
40
80.4
54
48
66.3
70.3
74.3
84.3
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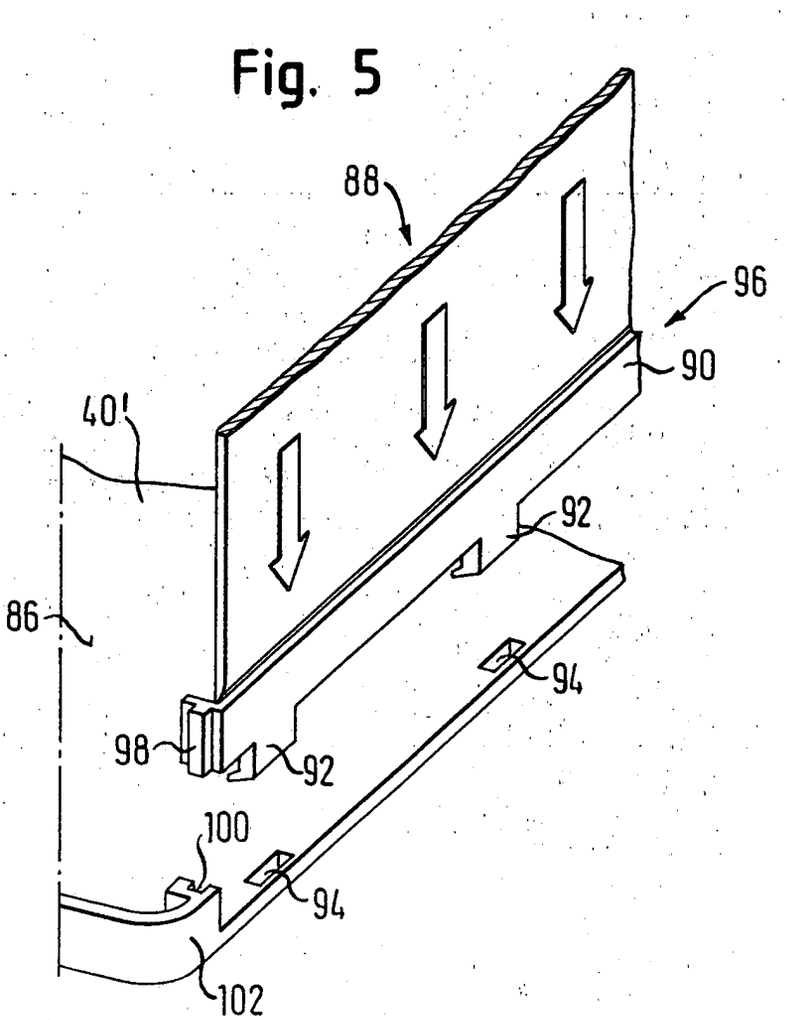
58
78.1
76
80.1
60
62

Fig. 5



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# EUROPEAN SEARCH REPORT

Application Number
EP 03 00 8988

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The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
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| THE HAGUE | 2 October 2003 | Kamerbeek, M |

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